in view of the D'Amico, et al. '593 reference, and further in view of the Gitlits reference and yet further in view of the Barlett et al. reference, and in even further view of the Shi reference, and in yet further view of the Sexton et al. reference, and further in view of the Horiguchi reference.

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

An exemplary embodiment of the claimed invention, as defined, for example, by independent claim 1, is directed to an automobile communications method for an on-board mobile station across a plurality of radio zones which are consecutively arranged along a road. The method includes providing each of the radio zones with a plurality of M communication frequencies, providing N plurality of time slots in one period in each of the radio zones, switching between the M communication frequencies within each of the radio zones using a time division scheme such that a different one of the N time slots is allocated for adjacent radio zones for each of the plurality of M communication frequencies by sequentially switching from one to another at a time of every N/M time slot.

As explained by the present specification, conventional communication systems use a Time Division Multiple Access (TDMA) communication protocol in which different time slots are used at the same frequency. These TDMA systems enable a wide frequency range to be used. However, it is necessary to increase transmission power by an amount which corresponds to the increase in noise to obtain a desired carrier to noise ratio. Additionally, various distortions deteriorate performance. Further, wide-band devices are needed.

By contrast, the present invention provides a novel system having advantages of both

Frequency Division Multiple Access (FDMA) and TDMA systems by arranging a plurality of M frequencies in each radio zone and switching these M frequencies in a time division mode within each radio zone and also by switching one of N time slots for each frequency between adjoining radio zones so that individual mobile stations do not have to switch frequencies within a single radio zone.

Rather, each mobile station can communicate continuously using the same frequency within a single radio zone across the plurality of radio zones merely by switching the time slot. In other words, continuous communication is allowed at the same frequency for a mobile station within a single radio zone and the frequency range of each of a plurality of frequencies is substantially equivalent to that of an existing FDMA system.

Additionally, the present invention has a further advantage in that interference between adjoining zones can be avoided. Each zone communicates using a plurality of M frequencies and switches between these plurality of M frequencies in time division manner which is coordinated with adjoining radio zones so that adjoining radio zones do not communicate simultaneously using the same frequency.

In this case, as long as the same frequency is not selected at the same time between adjoining zones, then time slot positions used in adjoining zones are arbitrarily selected. In other words, it is not necessary to select different time slots between adjoining zones. On the other hand, when a communication frequency is switched, if the same frequency can be selected at the same time between adjoining zones, then different time slots are allocated between adjoining zones.

The present invention provides the above objects and advantages by providing N plurality of time slots in one period in each of the radio zones, switching between the M